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Montana rail
plan amendment

MONTANA RAIL PLAN AMENDMENT

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Prepared for

THE MONTANA DEPARTMENT OF TRANSPORTATION

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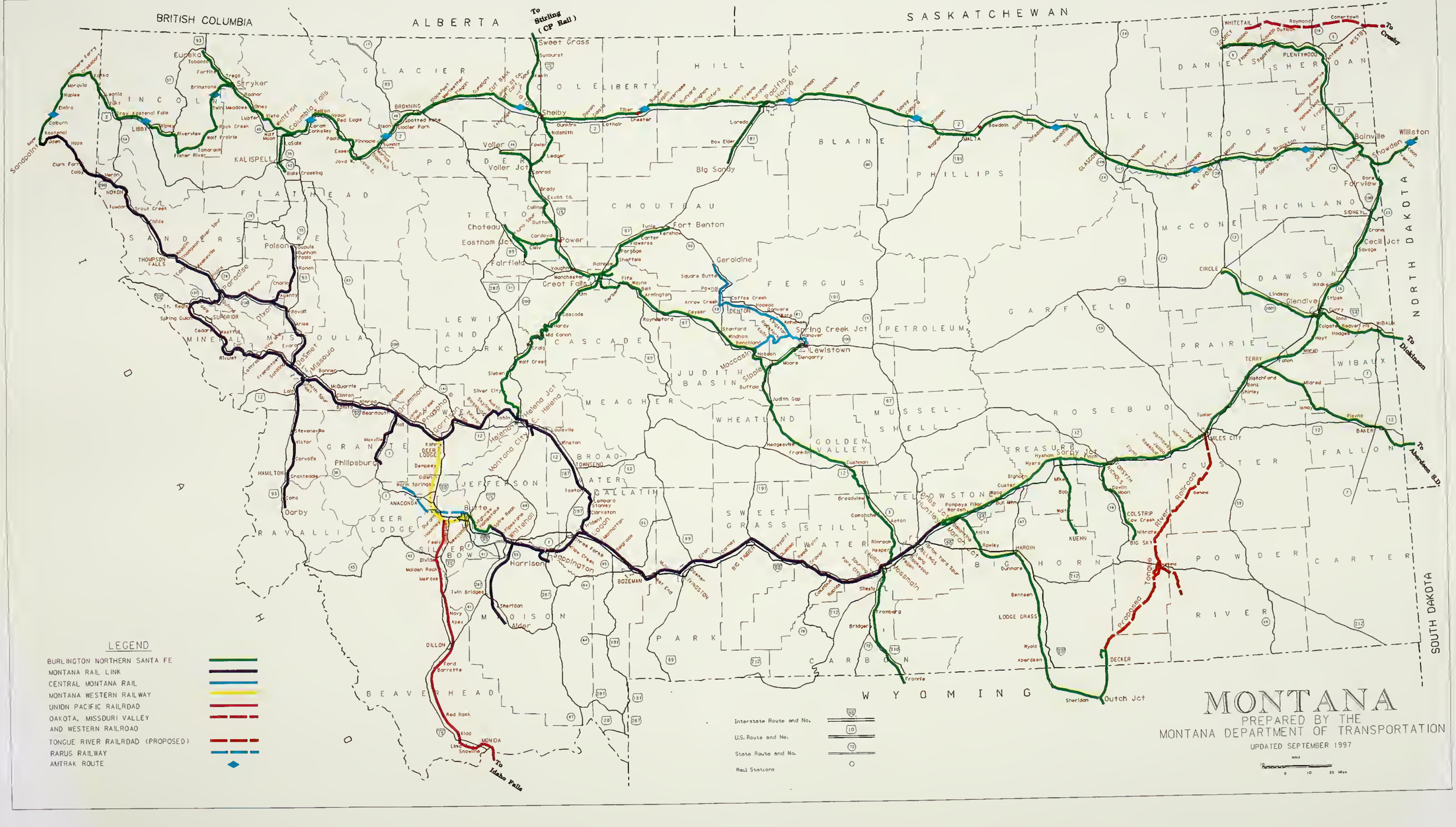
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
To Stirling (CP Rail)
To Crosby
To Dickinson
To Aberdeen S.D.
To Idaho Falls
Sweet Grass
Shelby
Conrad
Choteau
Fort Benton
Power
Fairfield
Great Falls
Geraldine
Lewistown
Spring Creek Jct
Harlowton
Billings
Hardin
Forsyth
Miles City
Glendive
Sidney
Fairview
Williston
Plentywood
Scobey
Whitetail
Raymond
Comertown
Bainville
Crane
Cecil Jct
Savage
Circle
Wibaux
Baker
Terry
Fallon
Custer
Powder River
Carter
Treasure
Rosebud
Big Horn
Yellowstone
Stillwater
Sweet Grass
Meagher
Wheatland
Golden Valley
Musselshell
Petroleum
Garfield
Prairie
Dawson
Richland
McCone
Valley
Phillips
Blaine
Hill
Liberty
Toole
Pondera
Teton
Glacier
Lincoln
Flathead
Sanders
Lake
Missoula
Mineral
Ravalli
Granite
Powell
Deer Lodge
Silver Bow
Beaverhead
Madison
Gallatin
Park
Carbon
Big Horn
Jefferson
Broadwater
Lewis and Clark
Cascade
Judith Basin
Fergus
Chouteau
Pondera
Toole
Liberty
Hill
Blaine
Phillips
Valley
Roosevelt
Sheridan
Daniels
Richland
Dawson
McCone
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Petroleum
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Meagher
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Lincoln
Flathead
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Missoula
Mineral
Big Sandy
Box Elder
Laredo
Havre
Pacific Jct
Hingham
Rudyard
Chester
Tiber
Dunkirk
Galata
Kremlin
Gildford
Zurich
Dodson
Malta
Bowdoin
Glasgow
Wiota
Vandalia
Tampico
Saco
Whitewater
Vida
Nashua
Fort Peck
Poplar
Wolf Point
Culbertson
Brockton
Froid
Medicine Lake
Redstone
Homestead
Scobey
Flaxville
Westby
Opheim
Whitetail
Raymond
Comertown
Plentywood
Outlook
Antelope
Peerless
Medicine Lake
Redstone
Homestead
Froid
Culbertson
Brockton
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Harlem
Chinook
Lohman
Havre
Pacific Jct
Hingham
Rudyard
Gildford
Kremlin
Fresno
Burnham
Chester
Tiber
Dunkirk
Galata
Shelby
Sweet Grass
Coutts
Del Bonita
Cardston
Magrath
Raymond
Stirling
Milk River
Sherard
Whitlash
Loma
Big Sandy
Box Elder
Laredo

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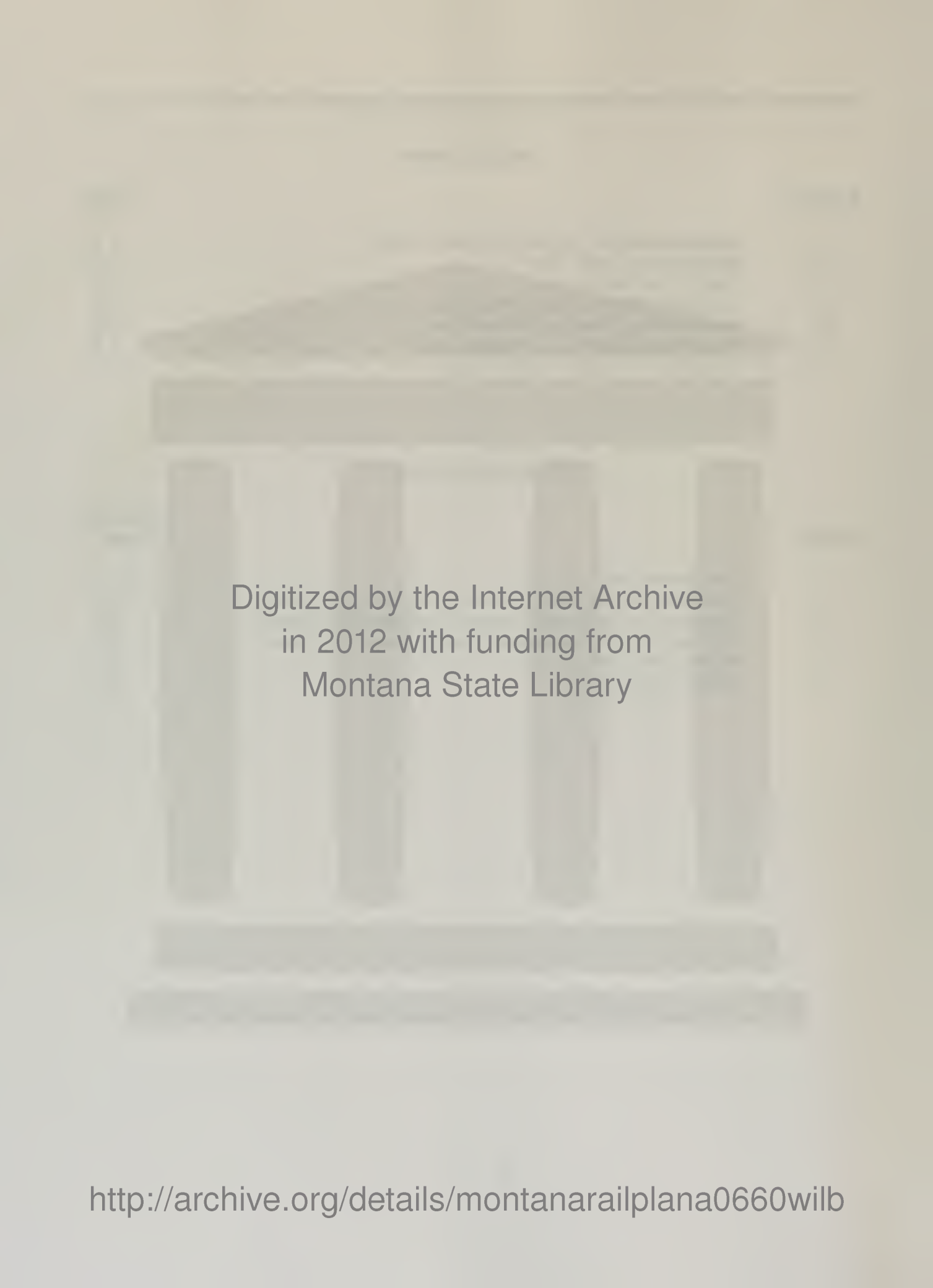
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Chapter 1
INTRODUCTION

This document serves as an Amendment to the *1993 Montana Rail Plan Update*. It contains updated information on the state rail system as well as the analysis of a project for which the state plans to request federal rail service assistance funding. The candidate project line was discussed in the *1993 Update*.

Federal Rail Assistance Program

This document has been prepared pursuant to Section 5(g) of the Department of Transportation Act as amended by the Local Rail Service Reauthorizing Act, December 11, 1989. An approved State Rail Plan is a prerequisite for eligibility to receive local rail freight assistance. The act requires "an adequate plan for rail services in such state, including a suitable process for updating, revising and amending such plan; and that such State plan is administered or coordinated by a designated State agency and provides for the equitable distribution of resources."

The Local Rail Freight Assistance Program (LRFA) was initiated in 1973 at the commencement of several railroad bankruptcies to alleviate/mitigate the impacts on local rail service. It has undergone several revisions since that time, and while the program still exists, it is currently unfunded and its future is in doubt. A more detailed history of the program was contained in the *1993 Update*.

State Rail Plan

The State of Montana published its initial State Rail Plan in August 1979. Subsequent Updates were published in September 1982, May 1985, and June 1993. Supplements were published in August 1980, March 1984, and December 1987. This document, therefore, represents Montana's eighth publication associated with its rail plan.

Designated State Agency

Montana law MCA-60-11-101 provides that the Montana Department of Transportation (MDT) is the designated agency for rail planning and the preparation of the Montana State Rail Plan. Prior to the creation of MDT in July 1991, this responsibility lay with the Montana Department of Commerce.

Contents of The Amendment

Chapter 2 describes the changes in the Montana rail system which have occurred since the 1993 Update. The chapter also provides an overview of the state's current rail traffic and the route miles now operated in the state by each railroad.

Chapter 3 describes two projects considered for assistance funding and the analysis of one for which an application is anticipated to be submitted. An appendix to the Amendment contains the Benefit-Cost Methodology for the Local Rail Freight Assistance Program published by the Federal Railroad Administration.

Chapter 2
THE MONTANA RAIL SYSTEM

The physical characteristics of the Montana rail system have changed very little since the *1993 Montana State Rail Plan Update* was published. The principal change has been related to the corporate structure of the major railroads serving the state with both Class I carriers having been involved in mergers with other railroads. These mergers are described in the following paragraphs. Also described is the current state rail system and the movement of rail traffic over the system.

Railroad Mergers

Burlington Northern and Santa Fe - The $4.7 billion merger of the Burlington Northern Railroad Company (BN) and the Atchison, Topeka and Santa Fe Railway Company (ATSF) was approved by the Interstate Commerce Commission (now the Surface Transportation Board) in 1995. The new railroad, the Burlington Northern and Santa Fe Railway Company (BNSF), now has a single line system of approximately 31,000 route miles.

Because no ATSF lines served Montana, the impacts of the merger on the state will relate to service rather than physical alterations of the rail system. Based on the operating plan filed as part of the merger application, no appreciable changes in operations over former BN lines are anticipated.

Union Pacific - Since 1993, the Union Pacific Railroad (UP) has been involved in two major mergers. In February of 1995, the Interstate Commerce Commission authorized the acquisition of control of the Chicago NorthWestern Railway (CNW) by the Union Pacific. The UP exercised its right to control the CNW later that year. The primary advantages to Montana shippers are a shorter route and single-line service to Chicago and interchange with major eastern rail carriers.

Also in 1995 (November 30), the UP and Southern Pacific Railroad (SP) submitted a merger application to the Interstate Commerce Commission. Approval was granted in 1996. The new

railroad is North America's largest with 34,000 miles of track in 25 states and combined revenues of $9.5 billion. As was the case with BNSF, the merger of the UP and SP will have no impact on the physical composition of Montana's rail system as no SP lines were located in the state. In addition, there will be few service impacts as the UP's presence in the state is limited. The combined carriers will operate as the Union Pacific Railroad.

Other Rail System Changes

Amtrak - Amtrak intercity passenger service across the northern part of Montana underwent changes between 1993 and 1997. The service, comprised of Amtrak's *Empire Builder*, provided daily service with a train in each direction in 1993. In February of 1995, it became one of many Amtrak service cutbacks as the carrier dealt with budget problems and service was reduced to four days per week west of St. Paul, Minnesota. It has since been returned to daily operation.

Tongue River Railroad - The Tongue River Railroad, a 17-year-old proposal to construct a new rail line, has just been granted final approval by the STB. The approval was related to one segment of a 130-mile route between the BNSF main track at Miles City and the end of a mine spur at Decker. The segment between Ashland and Miles City was approved by the STB's predecessor, the Interstate Commerce Commission, in 1985. It was not constructed at that time due to a desire to construct the entire line at one time. [1] The route will serve as a short cut for Powder River Basin Coal.

Due to the project's long maturation, many agreements and permits have expired and the Environmental Impact Statement is over 10 years old. The railroad has been asked to resubmit its permits and the state will perform an environmental update. The STB approval is good for three years, but the carrier reportedly is not in a position to initiate construction for two years.

[1] Data for this discussion taken from *The Short Line*, Pleasant Garden, NC, Issue #137, p.12.

Railroad Companies

As stated earlier, since the last study was completed in 1993, the number and ownership of rail lines has not changed. The state's railroads, Burlington Northern and Santa Fe, Central Montana Rail, Montana Western, Rarus, Montana Rail Link, the Dakota, Missouri Valley & Western, and Union Pacific are shown on the inserted rail system map (Shown as Figure 2-1 in the Table of Contents) and the mileage operated by each carrier in 1996 is shown in Table 2-1.

The BNSF operates the largest portion of the state system, 65 percent, followed by Montana Rail Link with 25 percent. Thus 90 percent of the state rail system is in the hands of two railroads.

Table 2-1
MONTANA RAILROAD TRACKAGE
OPERATED IN 1996

COMPANY	MONTANA ROUTE MILES OWNED, LEASED AND OPERATED	PERCENT OF TOTAL STATE ROUTE MILES OPERATED
Burlington Northern & Santa Fe	2,135	64.7
Central Montana Rail	87	2.6
Dakota, Missouri Valley & Western	57	1.7
Montana Rail Link	812	24.6
Montana Western	59	1.8
Rarus	25	0.8
Union Pacific	125	3.8
TOTAL MILES	3,300	100.0
Sources: Railroad Annual Reports to the Montana Public Service Commission for the Year 1996.		

Freight Traffic

Due to Montana's geographic location, the major railroads which serve the state are oriented toward transcontinental east-west flows. Thus the rail system handles large volumes of through or overhead traffic (that which neither originates nor terminates within the state, but rather passes through the state). Nevertheless, significant volumes of rail traffic also originate in the state.

Traffic Originated/Terminated - Table 2-2 depicts the rail traffic by commodity which was originated and/or terminated in Montana in 1996 based on reports filed with the Montana Public Service Commission. Of the total of almost 53 million tons, the vast majority of the tonnage, approximately 90 percent, was shipped out of the state, while the remainder was shipped into it. The data filed with the Public Service Commission does not permit identification of the traffic which was both originated and terminated within the state (intrastate), but based on the STB's Waybill Sample for 1992 - 1995, it is probably just over a million tons.

As evident from examination of Table 2-2, coal is the dominate rail commodity representing 57 percent of total tonnage. Farm products are a distant second at 12 percent followed by lumber and wood products at 7 percent. Thus, three commodities comprise three fourths of Montana's originating and/or terminating rail traffic.

Traffic Patterns - The originating and destination states of rail traffic shipped to and from Montana are graphically shown on Figures 2-2 and 2-3. The traffic being shipped out of the state moves virtually all over the country, although there are concentrations in selected Midwestern states and the West Coast . As for freight terminating in the state, its origins are not quite as dispersed as destinations are for originated traffic. The state itself is the largest source (intrastate traffic).

Through Traffic - The rail system is used for purposes other than the movement of freight bound to/from Montana. Rail traffic originating beyond the state's boundaries and also destined for points beyond its boundaries moves en route over the state's rail system. This through, or overhead traffic, due to the presence of heavily used main lines, is substantial, almost 38 million tons based on the 1995 STB Waybill Sample.

As can be seen from Figure 2-4, the principal through flows are to/from the Midwest, and the Pacific Northwest. In terms of commodities, farm products are the largest through classification accounting for almost half of the total tonnage. Miscellaneous mixed shipments comprise the next single largest category at just over 5 million tons. This category reflects the largest share of the

Table 2-2
MONTANA RAIL TRAFFIC
1996

COMMODITY		TONS ORIGINATED/ TERMINATED
STCC [1]	Description	(000)
1	Farm Products	6,292,981
8	Forest Products	50
9	Fresh Fish & Other Marine Products	922
10	Metallic Ores	934,603
11	Coal	30,953,941
13	Crude Petro Nat Gas & Nat Gsln	0
14	Nonmetalic Minerals Except Fuels	712,592
19	Ordnance & Accessories	4,761
20	Food & Kindred Products	720,542
21	Tobacco Products	38
22	Textile Mill Products	3,027
23	Apparel & Other Finished Textile Prd. Incl. Knit	130
24	Lumber & Wood Products, exc Furniture	3,651,558
25	Furniture & Fixtures	8,911
26	Pulp, Paper & Allied Products	995,469
27	Printed Matter	403
28	Chemicals & Allied Products	1,063,651
29	Petroleum & Coal Products	2,068,044
30	Rubber & Miscellaneous Plastic Products	1,190
31	Leather & Leather Products	0
32	Stone, Clay, Glass & Concrete Products	1,538,565
33	Primary Metal Products	821,332
34	Fabr Metal Prd Exc Ordn Machy & Transp	6,331
35	Machinery Except Electrical	6,523
36	Elect. Machinery, Equipment & Supplies	4,569
37	Transportation Equipment	128,129
38	Instruments Phot & Opt Gd, Watch & Clock	0
39	Miscellaneous Products of Manufacturing	2,046
40	Waste & Scrap Materials	343,124
41	Miscellaneous Freight Shipments	191,242
42	Containers, Shipping, Returned Empty	5,854
43	Mail, Express or Other Contract Traffic	577
44	Freight Forwarder Traffic	16,185
45	Shipper Association or Similar Traffic	22
46	Miscellaneous Mixed Shipment Exc Fwdr & Shpr Assn	138,280
47	Small Packaged Freight Shipments	40,437
48	Hazardous Waste	11,369
49	Hazardous Material	2,211,561
50	Commodities Shipped in Bulk	1,905,735
	Total All Commodities	52,879,135

(1) Standard Transportation Commodity Code

Source: Reports filed with the Montana Public Service Commission.

TERMINATION OF RAIL FREIGHT TONNAGE ORIGINATING IN MONTANA

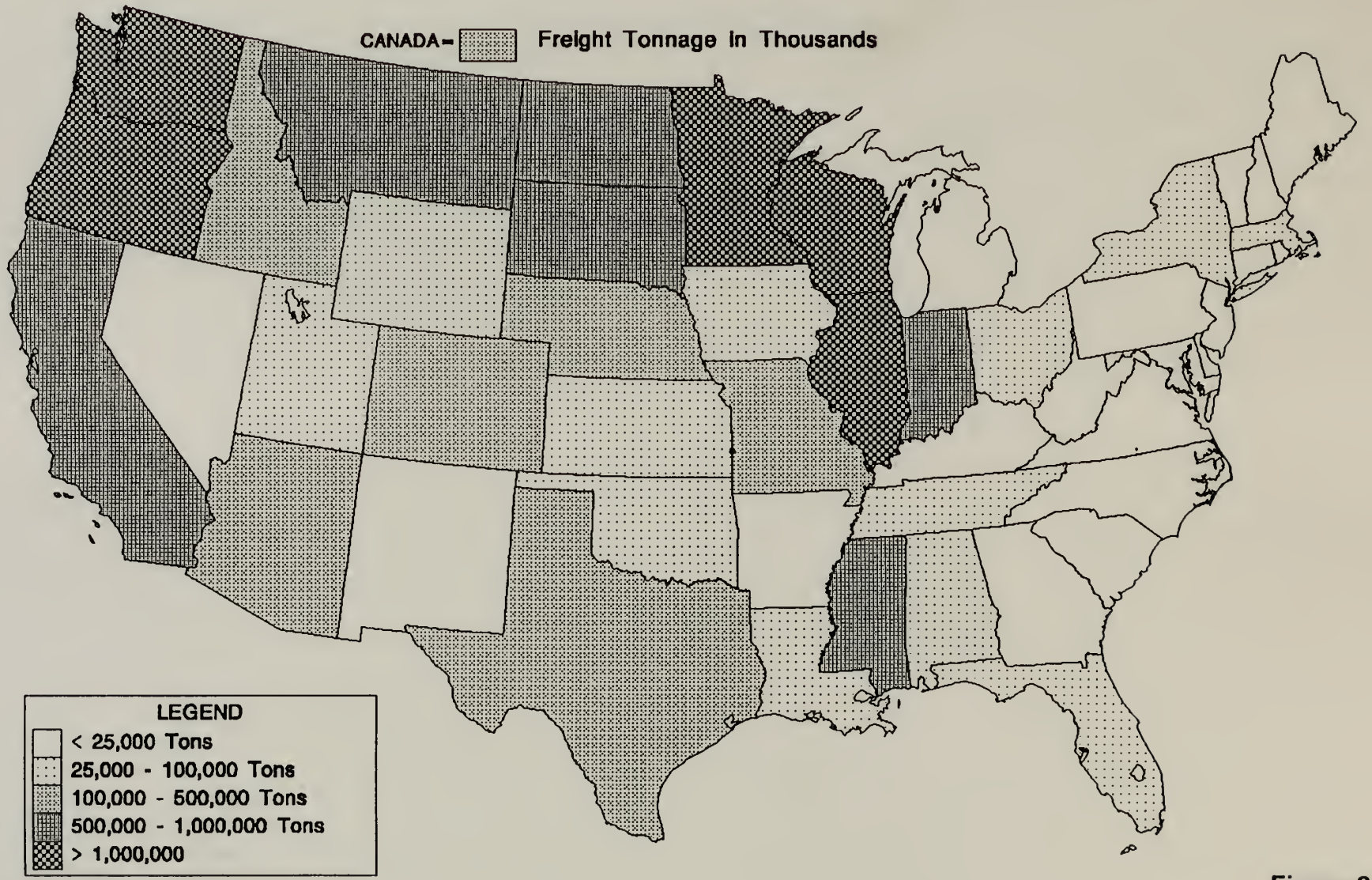


Figure 2-2

SOURCE: 1995 WAYBILL DATA

ORIGINATION OF RAIL FREIGHT TONNAGE TERMINATING IN MONTANA

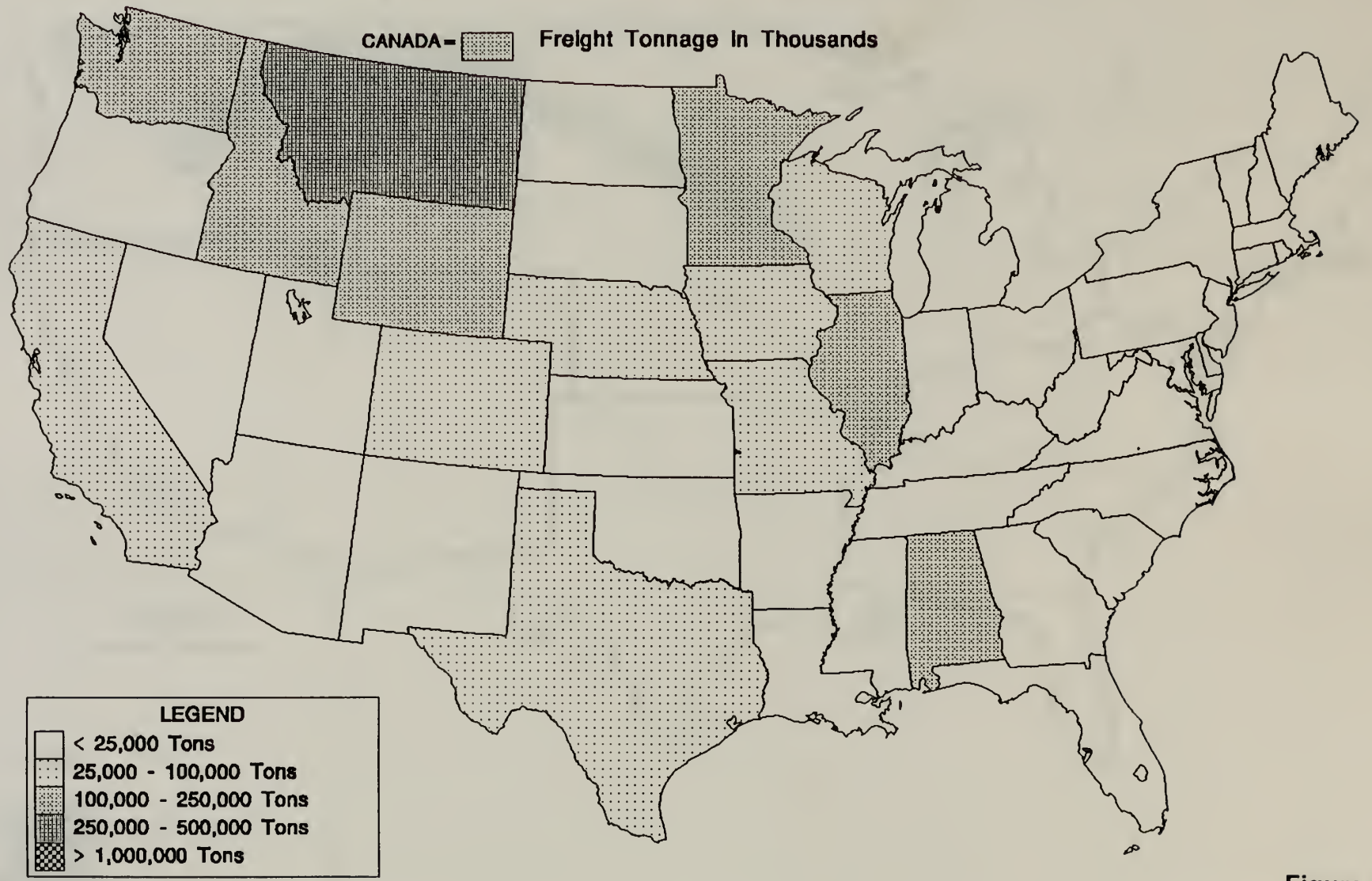
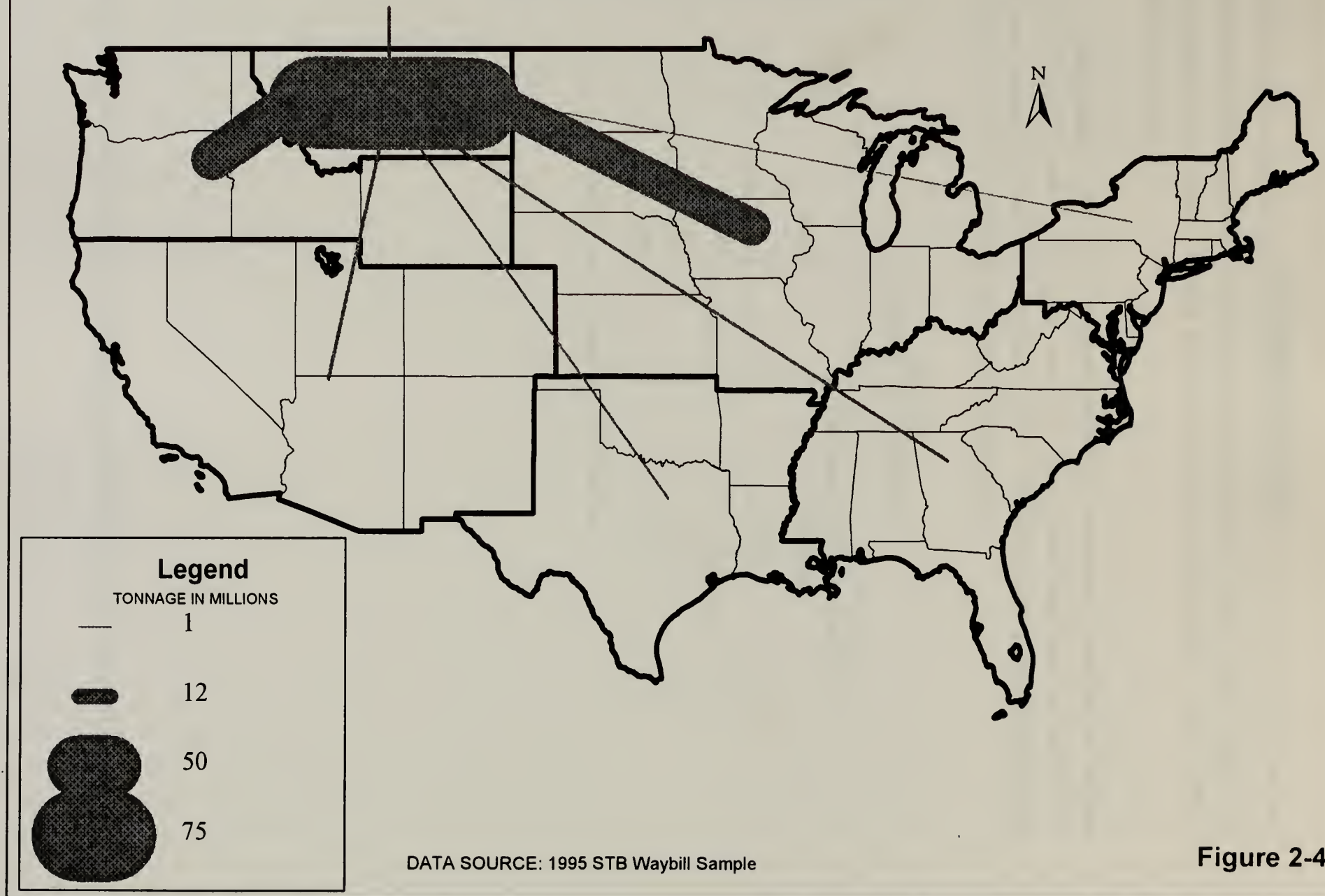


Figure 2-3

SOURCE: 1995 WAYBILL DATA

RAIL FREIGHT TRAFFIC MOVEMENTS
PASSING THROUGH MONTANA



DATA SOURCE: 1995 STB Waybill Sample

Figure 2-4

intermodal traffic but, as intermodal traffic is also contained within the other commodity groups, the total tonnage is much larger. In terms of carloads, the relative percentage is much higher at approximately 55 percent.

Traffic Trends - Commodity tonnage was available for three points in time from the Montana State Rail Plan and Updates -- 1981, 1991, and 1996. The originated/terminated rail traffic for the three years is shown in Table 2-3 for ready comparison. The traffic grew 20 percent between 1981 and 1996 and in terms of tonnage, 44.2 million to 52.9 million.

Table 2-3
HISTORIC RAIL TRAFFIC

YEAR	ORIGINATED/TERMINATED TONNAGE (000)
1981	44,182.3
1991	47,591.5
1996	52,879.1

Source: Railroad Annual Reports and State Rail Plans

Chapter 3
LINE ANALYSES

Two potential assistance projects were considered for funding. One, located in Shelby was a new construction candidate, and the other, located in the northeast corner of the state, a rehabilitation project.

NETA SPUR EXTENSION

In 1987, Toole County and the City of Shelby jointly established an inland port authority, the Northern Express Transportation Authority (NETA). In accordance with Montana Code Annotated 35-2-203, the port authority was to create a transportation and an intermodal infrastructure in northern Montana to market Montana products and services through cooperative efforts with state, national and international transportation marketing and manufacturing organizations. A local tax levy provides funds to provide basic staff support for administration of authority activities and marketing of port authority services.

The Port of Shelby is served by the main north/south interstate, I-15. Acting primarily as a gateway facility to Canada, it serves a portion of the 300 plus trucks per day that cross the Canadian border near Sweetgrass. Shelby is also served by a main line of the Burlington Northern and Santa Fe Railroad commonly called the "Hi-Line," as well as a secondary main line. The latter runs from the Montana-Canadian border south to Denver through Great Falls and Laurel. The NETA Spur is located on the secondary line.

Assistance Desired

The existing NETA Spur is located in the South Industrial Park. It springs from a BNSF spur off of the secondary main and serves a warehouse which provides a variety of functions ranging from storage, repackaging, minor product assembly and intermodal transfers (rail to and from truck). A new industry, which requires rail service, plans to locate on vacant land in the South Industrial

Park necessitating extension of the NETA Spur. Assistance has been requested to construct the track extension.

Project Eligibility

For a project to receive LRFA funding, it must first be deemed eligible for assistance. There are a number of conditions which must be met. First the project alternative must meet one of the three statutory eligibility criteria: 1) acquisition, 2) rehabilitation, or 3) new construction. The proposed project falls into the third category. In addition, the rail line related to the project must also be certified by the rail carrier as having carried five million gross ton miles per mile (MGTM/M) or less during the prior year. While the spur from which the new track would be extended meets this criterion, for all practical purposes, the spur is an industrial lead track from which individual industry tracks spring, and the actual rail line to which the spur is connected transported in excess of five MGTM/M last year. In addition, construction of the track will not have any influence on the continuance of rail service on the Shelby-Great Falls-Mossmain line, nor the existing spur which already serves other industries.

Finally, if all other conditions are met, the candidate project must have a ratio of benefits to costs calculated in accordance with FRA standard methodology (see Appendix A) greater than 1.0. There is no doubt that the location of the new industry would generate benefits in terms of employment and railroad revenue. The FRA's benefit-cost methodology, however, requires that both a project and a null alternative be established and the benefits be based on a comparison of the two. The null alternative is to represent the best estimate as to what will happen if the project is not undertaken. Since the industry for which the track is to be constructed is locating to serve a local geographic market, it can be assumed it will locate somewhere in the immediate area regardless. In this case, it is assumed that the lack of LRFA funds will not prohibit construction of the track, and as there is no difference between the project and null alternatives, there are no benefits generated.

Conclusions

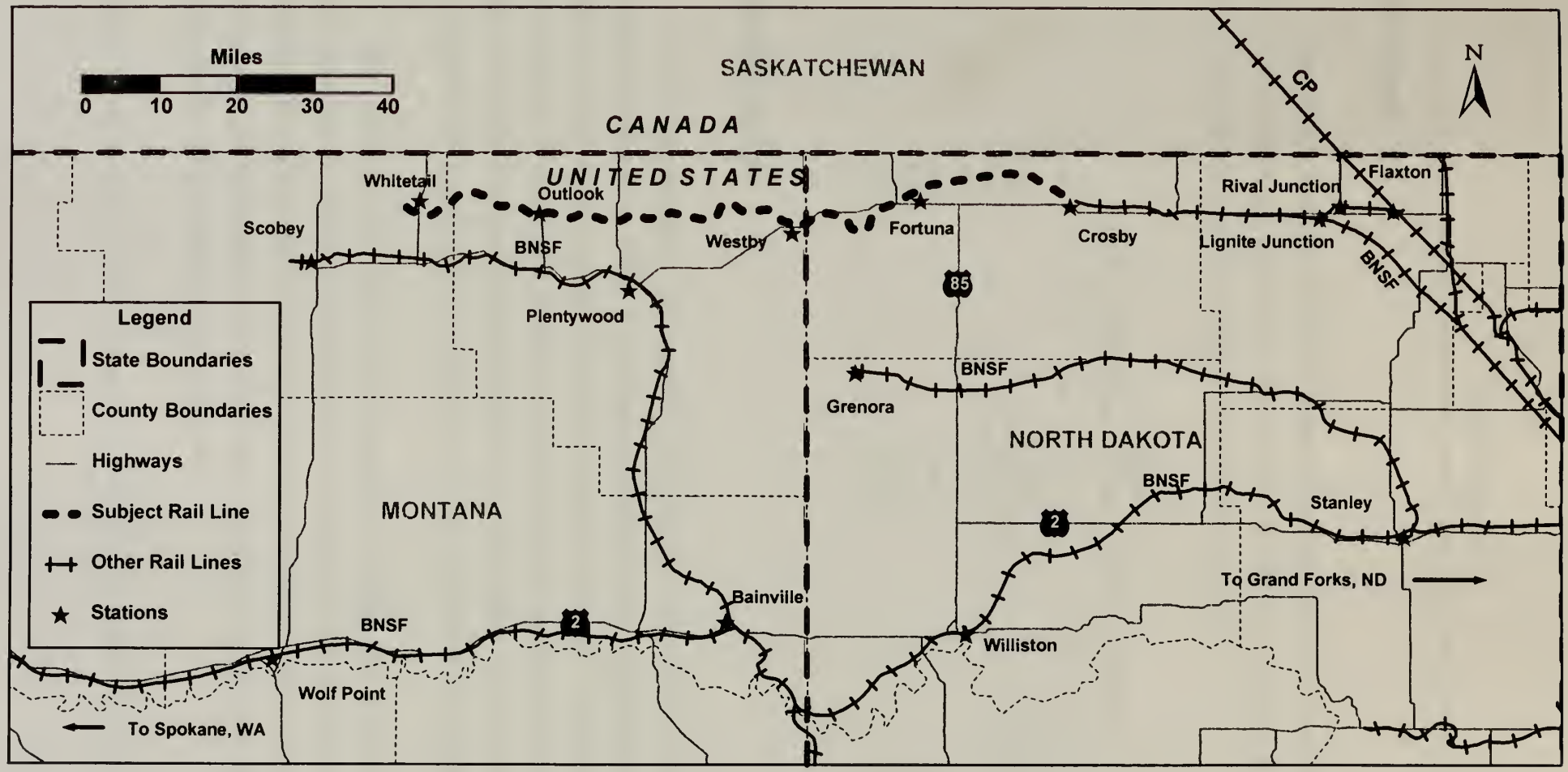
It is concluded that the proposed project does not meet the eligibility criteria of the federal program, nor does it conform to the intent of the program which is to assist in the preservation of local rail service. There are more appropriate funding sources for the project which should be pursued.

CROSBY, ND TO WHITETAIL, MT

The Soo Line Railroad, doing business as the Canadian Pacific Railway (CP), owns a rail line which runs from Crosby, North Dakota 95 miles to Whitetail, Montana. The line segment, commonly called the Whitetail Line, serves the stations of Ambrose, Colgan, Fortuna and Alkabo in North Dakota and Westby, Comertown, Dooley, Raymond and Outlook in Montana in addition to its termini as shown on Figure 3-1. The line segment connects with CP's Canada - Minneapolis main track at Flaxton, North Dakota, 138 miles east of Whitetail. Operations between Crosby and Lignite Junction (33 miles), just west of Flaxton, are conducted using trackage rights over the Burlington Northern and Santa Fe. The line is leased and operated by the Dakota, Missouri Valley and Western Railroad (DMVW).

Service Area

The economic base of the area served by the line segment is heavily dependent upon agriculture. The major crops are wheat and barley which comprise the traffic on the line. In addition, the line lies in close proximity to the Canadian border with numerous border crossings (ports of entry) being 6-16 miles to the north.



WHITETAIL LINE STUDY AREA

Figure 3-1

Traffic History

Carloadings handled over the line segment have averaged 3,174 over the last four years of record. This average equates to 33.4 cars per mile. Carloading by year are shown in Table 3-1 below. Line segment density in 1996 was less than five MGTM/M.

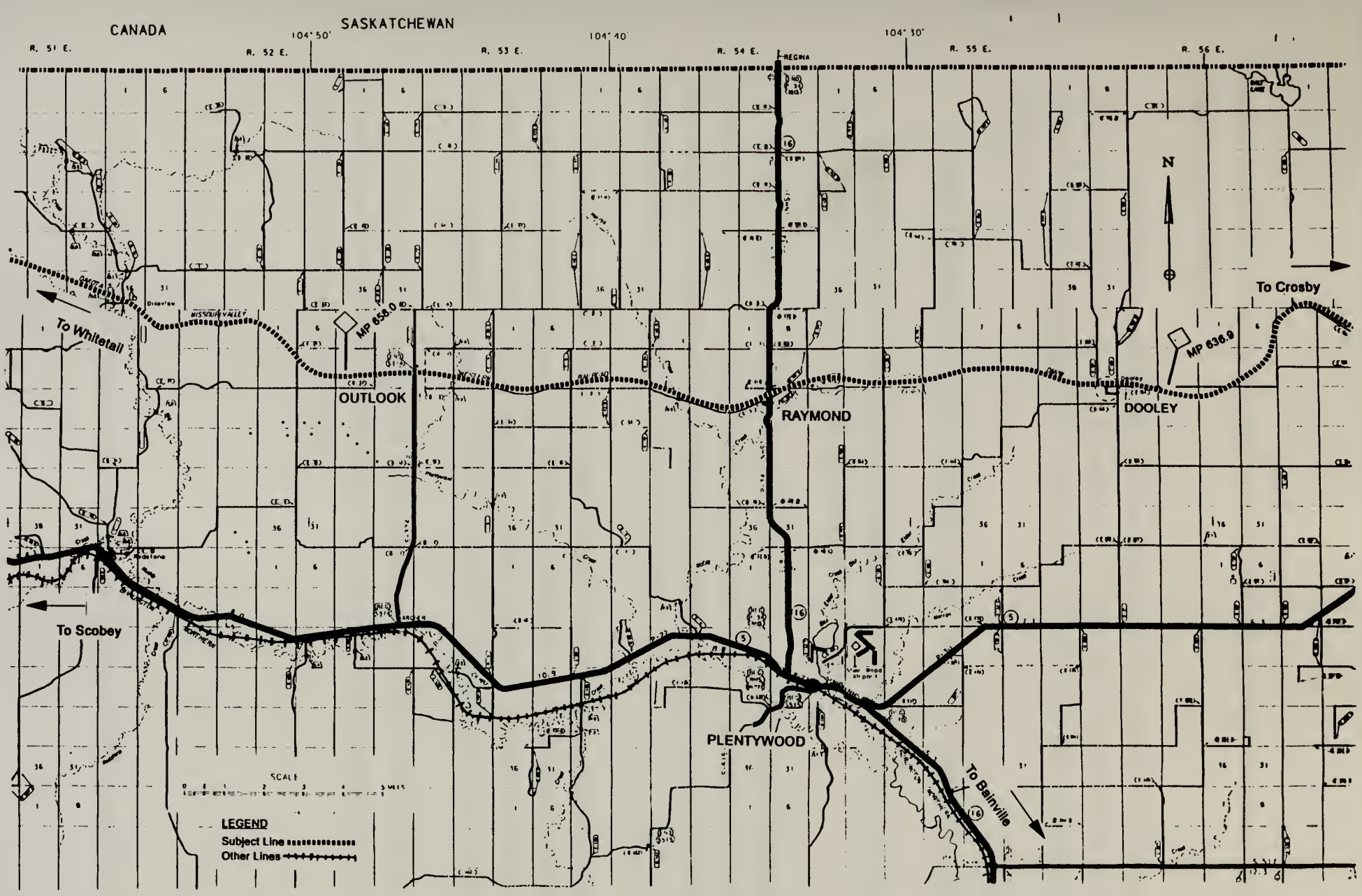
Table 3-1
CROSBY-WHITETAIL ANNUAL CARLOADINGS

YEAR	TOTAL CARLOADS	CARLOADS PER MILE
1993	3,937	41
1994	3,041	32
1995	3,508	37
1996	2,208	23

Assistance Desired

The Crosby-Whitetail line segment has been the subject of an ongoing incremental rehabilitation project since 1996. The project has progressed by prioritizing line segments based on need. Tie and ballast work was authorized between Crosby and Fortuna, North Dakota (23.5 miles) in 1996 to be completed in 1997 which was funded in part through LRFA. A ten-mile rail relay project in the same segment has been authorized and is scheduled to be completed in 1998. Tie work was also performed by CP in 1996 on 35 miles of track between Westby and Whitetail.

The segment of the line being considered for rehabilitation at this time is a 21.1-mile segment between Dooley and Outlook (MP 636.9 - MP 658.0) which is on the line between Westby and Whitetail and which was not included in the 1996 work effort. The line segment is the subject of Figure 3-2. The proposal includes replacement of cross and switch ties, tie plates and grade crossing planks, and the addition of rail anchors.



PROJECT LINE SEGMENT

FIGURE 3-2

Benefit-Cost Analysis

The following benefit-cost analysis has been conducted in accordance with the methodology prescribed by the Federal Railroad Administration (FRA) for the Local Rail Freight Assistance Program (LRFA). The methodology, as published by the FRA, is contained in this document as Appendix A.

Project Alternative - The project alternative is rehabilitation and continued operation.

Null Alternative - Due to the condition of the track, continued operation over the line is not a long-term option. Therefore, the null alternative is abandonment.

Project Costs - The estimated rehabilitation costs for the project segment for which an application for assistance is anticipated to be made, is the subject of Table 3-2. The major work effort consists of tie replacement with crossing surface renewal and the addition of rail anchors. As revealed by Table 3-2, the total estimated cost is $633,000.

The Table 3-2 sum, however, represents only part of the total rehabilitation cost which is comprised of all of the work elements, both those already performed and those programmed or planned. The entire project, by line segment, work effort, and date is contained in Table 3-3 which shows the total rehabilitation cost to be estimated at $3.26 million spread over three years.

To arrive at the total project costs, the net liquidation value (NLV) of the line segment as it now exists has to be added to the rehabilitation cost. The NLV is estimated to total $2,161,060, bringing total project costs to $5,416,923.

Table 3-2
REHABILITATION ESTIMATE
Whitetail Line
M.P. 636.97 - 658.00

MATERIAL		PER UNIT	TOTAL
12,700	Cross Ties 6" x 8" x 8'6"	$17.94 ea.	$227,838
91	Switch Ties	38 ea.	3,458
830	Kgs. 50 lbs. Spikes	15.39/kg.	12,774
64,768	Anchors, 72.02	1.18 ea.	76,426
600	Anchors, 100 GN	1.28 ea.	768
4,000	Comb. Punch Plates	(O.H. from Proj. E)	
30	Bdls. of 500 Tie Plugs	8.05/Bdl.	242
58	Untrtd. 16' x 5" x 8" X-ing Planks	23.82 ea.	1,382
300	Ship Spikes ½" x 10"	0.65 ea	195
	TOTAL MATERIAL		$323,085
	INSTALLATION		
12,541	Cross Ties Installed	$15.59 ea.	$195,514
91	Switch Ties Inst.	39.05 ea.	3,554
22	Miles Anchored to Pattern	2,994/mi.	65,868
232	Ft. X-ings Rebuilt	30.75/ft.	7,134
	TOTAL INSTALLATION		$272,070
Project Management & Contingencies			$37,845
	PROJECT TOTAL		$633,000

Source: Canadian Pacific Railway & Robert E. Ahlf, 10-29-96.

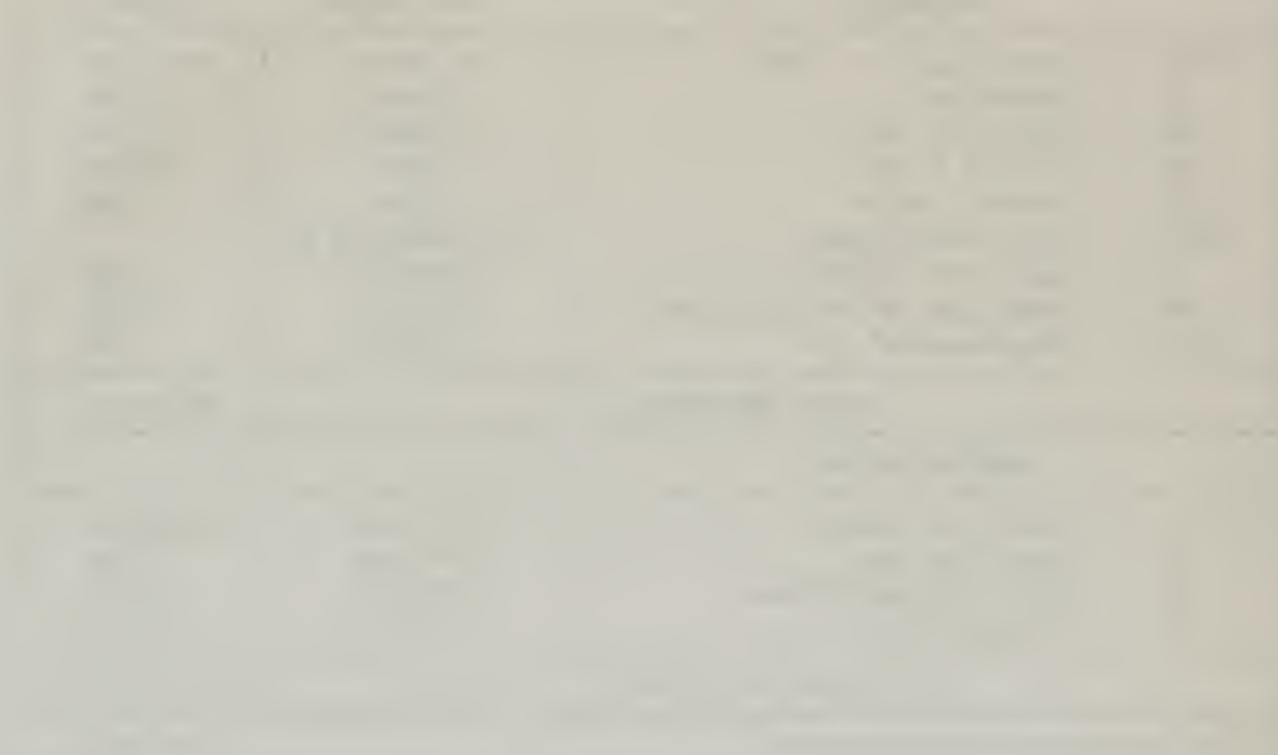


Table 3-3

TOTAL REHABILITATION COST

Whitetail Line

	WORK PERFORMED		
LINE SEGMENT	**Description**	**Date**	**COST**
Crosby - Fortuna MP 581.8 to 605.3	Timber and Surface[1], and anchors	1996-97	$1,009,878
MP 581.8 to 591.6	Replace rail	1997-98	783,985[2]
Westby - Whitetail MP 620.3 to 636.9 MP 658.0 to 676.6	Ties and Anchors	1996	829,000
MP 636.9 to 658.0	Ties and Anchors	1998	633,000
TOTAL ESTIMATED COST			$3,255,863

(1) Including ballast.
(2) Adjusted for salvage value of 60-lb rail being replaced ($156,007).

Project Benefits - Project benefits consist of both transportation efficiency benefits and secondary benefits. The transportation efficiency benefits are comprised of reduced shipper transportation costs and branch line operating profits. Secondary benefits take the form of the avoidance of highway impacts.

Shipper Transportation Costs - If the line were to be abandoned, the shippers would have to convert to truck transportation, either long-distance to the termination points, or short-haul to another elevator for transloading to rail. Since the typical destinations for the vast majority of the traffic range from 650 to 1,250 miles, the latter alternative appears to be the most economical.

The short-haul alternative cost is comprised of three elements -- 1) the trucking cost; 2) elevation at the alternate elevator (double handling); and, 3) the rail rate at the alternate elevator.

The alternate elevators would most likely be Crosby on the eastern end, and the subterminal at Plentywood which is located on the BNSF for the western end. Carload rates on the Whitetail Line have been maintained competitively with points on the BNSF line. Therefore, the cost difference is based on trucking and elevation costs.

These costs were computed for the Crosby-to-Fortuna analysis conducted as part of the *1996 North Dakota Rail Plan Update* by the Upper Great Plains Transportation Institute (UGPTI). They equated to $466,199 annually for both North Dakota and Montana shippers. The sum was computed by matching the traffic movements with the most logical alternate elevator, determining the appropriate highway mileage and applying unit trucking and transloading costs of $0.0549 per ton-mile and $0.05 per bushel, respectively.

Railroad Profits - The determination of railroad profits or losses with continued operation, as the case may be, requires the calculation of both on- and off-branch operating costs and attributable revenues. In other words, the entire traffic movement, both over the Whitetail Line and the rest of the rail system required to reach the traffic's destinations is considered.

Revenue - cost calculations were also performed for the line by UGPTI and included in the *1996 North Dakota Rail Plan Update*, but only for the Crosby-to-Fortuna segment. The on-and off-branch profits of $1,775,945 per year estimated for that segment were added to the estimated annual profits for the Fortuna-Whitetail segment for total annual railroad profits of $2,944,571. Adjustments were also made for 1996 traffic levels which were not available when the previous analysis was prepared.

Highway Impacts - The trucks which would have to move the commodities to alternate elevators would have to operate over the local highway system, much of which is comprised of secondary roads not designed for the heavy truckloads to which they would be subjected. Again, the same methodology as used in the North Dakota Update was adopted and expanded to the roadway segments in Montana. Data for the Montana roads were obtained from the Highways and

Engineering Division of MDT. Highway impacts which would be avoided in both states by continued operation of the line are estimated to total $870,483 per year.

Salvage Value - An additional project benefit is the salvage value of the line at the end of the planning horizon. In this case, it is the NLV of the line at that time including the project materials. This value is estimated to total $2,984,939.

Benefit-Cost Ratio - The benefit-cost ratio calculation is the subject of Table 3-4 which contains a summary of project costs, benefits and present values. The $33.4 million present value of project benefits divided by the $5.3 million present value of the associated costs results in a benefit-cost ratio of 6.28, far in excess of the 1.0 required to make the project eligible for LRFA funding.

Table 3-4
BENEFIT - COST ANALYSIS
Whitetail Line
(1998 $)

Year	COSTS			BENEFITS							Present Value
	NLV	Rehab	Total Costs	Shippers Trans. Cost	Railroad Profit	Highway Impacts		Salvage	Total Benefits	Net Benefits	Net Benefit
1996	2,181,060	1,333,939	3,494,999						0	(3,494,999)	(3,494,999)
1997		896,932	896,932						0	(896,932)	(865,848)
1998		1,024,992	1,024,992	468,199	2,944,571	870,483			4,281,253	3,256,261	3,034,475
1999			0	466,199	2,944,571	870,483	0		4,281,253	4,281,253	3,851,389
2000			0	466,199	2,944,571	870,483	0		4,281,253	4,281,253	3,717,916
2001			0	466,199	2,944,571	870,483	0		4,281,253	4,281,253	3,589,068
2002			0	468,199	2,944,571	870,483	0		4,281,253	4,281,253	3,464,686
2003			0	468,199	2,944,571	870,483	0		4,281,253	4,281,253	3,344,614
2004			0	468,199	2,944,571	870,483	0		4,281,253	4,281,253	3,228,704
2005			0	466,199	2,944,571	870,483	0		4,281,253	4,281,253	3,116,810
2006			0	466,199	2,944,571	870,483	0	2,984,939	7,266,192	7,266,192	5,106,581
PV's	2,161,060	3,154,968	5,316,026	3,409,622	21,535,597	6,366,418	0	2,097,766	33,409,403	28,093,378	28,093,378

Discount Rate	3.59%	NPV	28,093,378
		B/C Ratio	6.28

A:\FL\TBL3-4.WK1
10/06/97

Year 1997 rehab cost was reduced for salgaved material ($ 156,007)

APPENDIX A

BENEFIT-COST METHODOLOGY

FOR

THE LOCAL RAIL FREIGHT ASSISTANCE PROGRAM

Required by the
Local Rail Service
Reauthorizing Act

(PL 101-213: 12/11/89)

Published by the
Federal Railroad Administration
July, 1990

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BENEFIT-COST METHODOLOGY FOR PROJECTS UNDER THE LOCAL RAIL FREIGHT ASSISTANCE PROGRAM

BACKGROUND AND INTRODUCTION

The Local Rail Service Reauthorizing Act of 1989 amended Section 5(n) of the Department of Transportation Act (Act), to require that:

> "The Secretary, no later than July 1, 1990, shall establish a methodology for calculating the ratio of benefits to costs of projects proposed under subsection (b), taking into consideration the need for equitable treatment of different regions of the United States and different commodities transported by rail. The establishment of such methodology shall be a matter committed to the Secretary's discretion."

Section (c)(2) of the Act was also amended as follows:

> "No project shall be provided rail freight assistance under this section unless the ratio of benefits to costs for such project, calculated in accordance with the methodology established by the Secretary under subsection (n), is greater than 1.0."

This methodology has been established and published in response to the Act's directive. It is to be used for calculating the benefit-cost ratios of all projects for which assistance is requested under Section (b) of the Act. These projects include acquisition of a

line of railroad or other rail property, rehabilitation or improvement of rail properties and construction of rail or rail related facilities.

The foundation for much of this methodology was provided by two earlier FRA documents: Benefit-Cost Guidelines Rail Branch Line Continuation Program (February 1980) and FRA Simplified Benefit-Cost Methodology (May 1982). Also, the twenty State methodologies that have been approved by the FRA were each reviewed, both to identify common elements and to identify individual State approaches to issues that might have been overlooked in the earlier FRA documents.

An example of the result of this review process is the inclusion in this methodology of the avoidance of increased highway maintenance costs as a legitimate secondary benefit of a rehabilitation project that prevents a rail line abandonment. Neither of the earlier FRA documents addressed this issue although 35 percent of the States submitting methodologies did. Most of the potential projects in these States were on branch lines in rural/farm areas where it could be expected that significant diversion of traffic onto farm to market secondary roads would indeed create the need for increased maintenance on those roads.

Inclusion in the methodology of this feature also complies directly with the Act's requirement that the Secretary take into consideration "...the need for equitable treatment of different regions of the United States and different commodities transported by rail."

THE BENEFIT-COST METHODOLOGY

General. The following sections present, in a step by step fashion, the benefit-cost methodology to be used for analyzing local rail freight assistance projects. The methodology and the steps included herein have been developed as the minimum with which the analyst must comply if the benefit-cost analysis is to meet the statutory requirements discussed earlier.

The analyst or other reader who is interested in learning more about the economic theory behind benefit-cost analyses in the local rail service area and/or the various techniques available for gathering and analyzing information is referred to the FRA's February 1980 Benefit-Cost Guidelines Rail Branch Line Continuation Program, and to the FRA's July 1978 Rail Planning Manual, Volume II: Chapter 2, "Light Density Lines".

It is important that the data underlying the benefit-cost analysis be reasonably current and data over three years old should not be considered valid, except where:

1. It is part of a historical time series of data that has an end date within three years prior to submission of the data, or:
2. An explanation accompanies submission of the data as to why it can reasonably be expected to reflect current conditions.

A benefit-cost analysis of a candidate rail freight assistance project must complete the following steps:

1. Establishing the project alternative;
2. Determining the project costs;
3. Determining the null alternative;
4. Using the standard planning horizon;
5. Using the FRA published discount rate;
6. Calculating transportation efficiency benefits;
7. Calculating secondary benefits;
8. Calculating salvage value;
9. Calculating the benefit-cost ratio.

Each of these steps is discussed in detail in the sections which follow.

Establishing the project alternative. The analyst must begin by identifying the problem, determining the possible solutions to the problem, comparing those solutions to each other and choosing which one (or more) to define as a "project" for purposes of performing the benefit-cost analysis or analyses. The project must meet one of the statutory eligibility criteria which are (1) acquisition of a line of railroad or other rail property, (2) rehabilitation or improvement of rail properties, or (3) construction of rail or rail-related facilities.

Table 1 presents in a summary fashion, for each of the eligible project alternatives, the type of indications that would lead the

analyst to choose that alternative for evaluation. It also presents categories of benefits and costs to be used in comparing various project alternatives with various null alternatives.

Determining the project costs. In most cases, the project cost will be equal to the cash and in-kind outlays used to build and implement the project, exclusive of financing costs. Since the analysis is from a public perspective, the source of funds or the financing arrangements have no bearing on the project cost. It is important to include the costs covered by shares paid in cash or in kind by the Federal Government, the State, the railroad, local governments, shippers (for the purpose of this methodology shippers also includes receivers), or anyone else contributing to the project. If costs will occur in future years, such costs should be discounted to a present value.

In some cases, there will be more to the project than just the direct cash and in-kind investments. For example, when the project alternative is rehabilitation and the null alternative is abandonment, the project cost should include the net liquidation value of the existing line. This is because the materials and land tied up by the line could be released for other purposes if the project were not undertaken. Similarly, any project which uses existing resources that under the null alternative would be sold must include the value of those resources as part of the project cost. Conversely, when the project alternative is rehabilitation and the null alternative is continued operation on poor track, then the

value of any material taken up during the rehabilitation and used elsewhere (e.g., light rail which is used on other lines in the railroad's system) should be subtracted from the cost of the rehabilitation project.

Determining the null alternative. Although seeming to be self evident, this step is as important as any in the process. The null alternative represents the analyst's best estimate as to what will happen if the project is not undertaken, and is the alternative against which any candidate project must be compared in the benefit-cost analysis. Possible null alternatives to various types of projects are shown in Table 1.

Chapter 2 of the Rail Planning Manual provides considerable information on data collection techniques and methods to assist the analyst in determining the null alternative.

Using the standard planning horizon. This is the number of years over which the benefits and costs of the project will be considered. The FRA has determined that for local rail freight assistance projects the appropriate planning horizon is ten years, and that horizon is to be used in all benefit-cost analyses in support of project applications.

Using the FRA published discount rate. The discount rate to be used each year in benefit-cost analyses will be published annually by the FRA after funds for the Local Rail Freight Assistance Program have been appropriated. Normally, that will be at the same

time as the FRA sends to the States the solicitation for applications for projects to be funded with that year's appropriation.

The published discount rate will be based upon the Federal Government's cost of borrowing (determined by the interest rate on 10 year obligations) less that element of the cost of borrowing that is estimated to represent expectations as to inflation.

Because the discount rate to be used will not include an inflation component, all forecasts of cost and benefits included in the analysis are to be in constant dollars.

Calculating transportation efficiency benefits. Transportation efficiency benefits are those which are a direct effect of the project alternative being considered. Much of the information used to calculate transportation efficiency benefits must, of necessity, be provided by railroads and/or shippers. To the extent permissible under law, any information considered commercially sensitive will be protected. Any information submitted with or as part of a benefit-cost analysis which the State wants to be treated confidentially should be clearly and specifically so identified.

Refer back to Table 1 for examples of the types of transportation efficiency benefits to be achieved under various combinations of project and null alternatives. Because the alternatives and the circumstances attendant to the alternatives will vary in each case, so will the procedures used to calculate the transportation efficiency benefits. Various procedures and formulas are presented

in the Benefit-Cost Guidelines for Local Rail Service Assistance. The procedures described here for the two most common sets of alternatives will allow for estimation of these benefits using readily available data. The two sets of alternatives discussed here are:

(1) The null alternative is abandonment and the project alternative is rehabilitation.

(2) The null alternative is continued operation and the project alternative is rehabilitation.

In the majority of other eligible project alternatives, the procedures discussed here will still be relevant if the words "acquisition" or "construction" are substituted for "rehabilitation" in the following discussion.

In describing the calculation of benefits, the terms "base traffic" and "incremental traffic" will be used often. Base traffic is the amount of traffic that would be shipped under both alternatives, by whatever mode. Incremental traffic is the amount of traffic that would be shipped under the project alternative, but not under the null alternative. For example, incremental traffic includes new traffic that the shipper chooses to produce and ship under the project alternative, but which would neither be produced nor shipped under the null alternative. Incremental traffic may also simply consist of traffic saved from extinction by preventing an abandonment that would put a shipper out of business. In

many cases, incremental traffic will be zero.

The calculation for determining the transportation efficiency benefits of the first set of alternatives (rehabilitation vs. abandonment) is as follows:

Transportation efficiency benefits resulting from implementing the project alternative = Reduced transportation cost to the shipper on base traffic

plus

Profits earned by the shipper in producing, shipping and selling incremental traffic

plus (minus)

Branchline operating profits (losses)

Table 2 presents a worksheet format for calculating transportation efficiency benefits for this set of alternatives. As an example of the calculation in a simple case, assume that under the project alternative (a rehabilitated branch line), the only business on the line will manufacture and ship 3,000 tons by rail at a rate of $5.00 per ton; that under the null alternative (abandonment), the shipper will only manufacture and ship by truck 1,000 tons at a rate of $10.00 per ton; that in manufacturing, shipping and selling the additional 2,000 tons under the project alternative, the

shipper earns an additional profit of $5,000; and that under the project alternative railroad on- and off-branch operating costs exceed attributable revenues by $4,000. Then,

Reduced transportation costs to shipper on base traffic =	(1,000 tons) x ($10.00 - $5.00) = $5,000
Profits earned by the shipper on incremental traffic =	$5,000
Branchline operating losses =	$4,000
Net transportation efficiency benefits =	$5,000 + $5,000 - $4,000 = $6,000

The example presented above is purposefully a simple one, and real world variations will undoubtedly present the analyst with complications. A more complex example is presented in the Appendix. Additionally, some of the differing circumstances that may arise are discussed below.

(1) The line may have more than one business and/or commodity using its services. If so, the reduced transportation costs to the shipper on base traffic and the profits earned by the shipper on incremental traffic would have to be computed separately for each commodity and business and then summed.

(2) Forecasted continued operation of the line at a deficit may result in surcharges. Such surcharges should be included in the rate paid under the project alternative.

(3) The approach presented here requires the analyst to establish the on- and off-branch operating costs and attributable revenue for the branch line. The Interstate Commerce Commission abandonment procedures, 49 CFR 1152, Subpart D (Standards for Determining Costs, Revenues and Return on Value), provide a methodology for calculating on- and off-branch operating costs as well as attributable revenue. If appropriate data are not readily available from the railroad(s), the analyst will need to study the line operation and develop data using appropriate unit costs.

(4) This approach assumes that the rate charged by an alternate mode is equal to its cost to provide service (including a return on investment). That assumption is necessitated by the fact that little or no information is normally available to allow the analyst to calculate alternate mode costs with any reasonable accuracy. If information is available to show that the alternate mode's rate is different than its cost to provide services, appropriate adjustments should be made (as were made by considering the operating income or loss attributable to the branchline).

(5) In the above example, a simple assumption is made about the profits earned by the shipper on incremental traffic. In reality, that information may not be easily obtained and will require cooperative dialogue with the shipper(s) or potential shipper(s) involved, as well as some independent confirming evaluation by the analyst. However, since it is in the shipper's self interest to have lower transportation rates, and thus higher profits, he should be motivated to cooperate.

In the second set of most commonly seen alternatives (rehabilitation 'versus continued operation), calculating the benefits involves estimating decreases in rail line operating costs for current traffic and estimating benefits of any newly generated traffic. If tariffs will remain the same under both alternatives, the benefits will normally be simply increased operating income for the branch line as a result of decreased operating costs. Table 3 provides a worksheet format for calculating and recording transportation efficiency benefits under this scenario. Occasionally, improved service as a result of rehabilitation may attract incremental traffic to a line even if there is no tariff decrease. In those cases, the increased profit to the shipper(s) of producing, shipping and selling that incremental traffic should be included. However, the analyst should verify that the shipper(s) commitment to provide the incremental traffic is real and will not vanish after the rehabilitation is finished.

If the operating cost savings resulting from the rehabilitation translate into lower tariffs as well as (or perhaps instead of) increased branch line operating income, or if the rehabilitation keeps tariffs from rising, then there will be shipper related benefits and the situation will be similar to the rehabilitation versus abandonment set of alternatives and should be handled according to the worksheet format shown in Table 4. It is important that the analyst track closely the savings in this case,

from operating cost savings to either increased branch line profits or rate reductions, and thus benefits to the shipper(s), so as to avoid double counting of benefits.

Calculating Secondary Benefits. Secondary benefits are those which are an indirect consequence of the project alternative being evaluated and normally reflect temporary dislocations that will be avoided by implementing the project alternative rather than allowing the null alternative to occur. The analyst should identify secondary benefits and quantify them for each year in the planning horizon, including all offsets, taking care to avoid double counting and the inclusion of transfer payments. If in the course of searching for and identifying secondary benefits, the analyst determines that they do not warrant consideration, then they need not be quantified and included in the analysis. However, a statement to that effect should be included.

In calculating secondary benefits, the analyst should take a Statewide and not a local perspective. Thus, for example, if a plant is expected to close as a result of a rail line abandonment, it is important to know what alternatives the plant's owner might pursue, if any. If the owner intends to relocate that plant's production to another part of the State, then the local employment and other impacts should not be included in the analysis, since they will be offset at the new location. If the owner intends to relocate out of State, then these impacts should be included. This pertains also to any tax revenues lost to the State or local

community as a result of the plants relocating out-of-state. In either case, the business relocation costs should be included in the analysis.

Typical secondary benefits to be addressed include:

(1) Relocation Expenses. If rehabilitation of a line prevents abandonment of that line and a shipper thus avoids moving his business elsewhere, the relocation costs saved are secondary benefits of the rehabilitation alternative. Information and data to quantify these benefits must be obtained through cooperative dialogue (or surveys) with the shipper(s) involved, and independent confirming evaluation by the analyst. Typical relocation expenses might include (but are not limited to) the cost of moving equipment and inventory, the cost of moving key employees and the cost of breaking a lease at the old location. In addition to relocation, shippers might have other alternatives, including changing markets. If so the avoidance of the costs of turning to those alternatives should be quantified as benefits.

(2) Unemployment. If the abandonment alternative would result in people losing their jobs, then the value of the wages earned by those people under the rehabilitation alternative constitutes a secondary benefit, but only for the length of time that they would have been unemployed under the abandonment alternative. The analyst must establish that period, beginning with data available from the State unemployment office as to unemployment rates and the length of time that people in the local

area (usually on a county basis) pursue unemployment claims. Care must be taken to keep the unemployment analysis reasonable. Inclusion of jobs lost beyond the shipper, railroad and secondary jobs that can be specifically identified as resulting from the abandonment should be avoided.

Because the benefit-cost analysis is to be conducted from a State-wide perspective, unemployment compensation should not be deducted from the lost wages, since within the boundaries of the State, unemployment compensation is a transfer payment. Additionally, the analyst should take into account as an offset the value of any jobs created by the abandonment alternative (e.g. trucking industry jobs if there is a significant movement to that mode). On the other hand, the value of new jobs created by the project alternative is an additional benefit if those jobs are filled by people who would otherwise remain unemployed.

(3) Highway Impacts. At some point, diversion of traffic from rail to truck may become significant enough to result in increased maintenance needs on the local road and highway system. Another highway related impact to be considered is increased air pollution. While increased highway maintenance costs and air quality impact may be difficult to quantify, they are legitimate secondary benefits.

It should not be forgotten that traffic diversion significant enough to increase road and highway maintenance costs also implies

offsets to the benefits achieved by avoiding that maintenance. Offsets to be taken into account at the appropriate steps in the analysis include any increased trucking industry employment (discussed earlier) and increased road and use tax revenues, such as fuel taxes and vehicle registration fees.

Calculating salvage value. The salvage value for the last year in the planning horizon should be calculated. In cases where the value of the entire line was used in the project cost, the salvage value of all materials in the line, i.e. the line's net liquidation value, would be used here. If the project cost represents only those capital improvements put in place by the project, it is the salvage value of only those capital improvements that would be used here.

Calculating the benefit-cost ratio. Using the FRA published discount rate, calculate the present value of the benefits (see Table 5 for an example format). The sum of the present values of the benefits should then be divided by the project cost to determine the benefit-cost ratio. In the case of a phased project, the present value of future project costs should be added to current year costs.

Table 1

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
1.Rehabilitation & continued operation	A. Abandonment	The line is in Category 1, 2 or 3 of a system diagram map; the railroad has stated publicly that with rehabilitation the line will be retained; financial analysis shows that the line is unprofitable but that rehabilitation will make it profitable.	(i) Difference between rates charged for service by alternate mode and rates charged for rail service on traffic that will move under both alternatives. (ii) Shipper business profits, on traffic that would not move without rehabilitation. (iii) Branch line projected operating profit. If a loss is projected, this amount is negative. (iv) Labor output that would be lost without rehabilitation. (v) Cost of moving businesses, if move would occur with abandonment. (vi) Increased cost of maintaining/repairing roads if modal-shift occurs with abandonment. (vii) Salvage value of entire line at end of planning horizon.	(i) Cost of rehabilitation materials and labor including the present value of any future rehabilitation required to keep the line operating. (ii) Net liquidation valu of line prior to rehabilitation

Table 1 (*continued*)

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
	B. Continued operation on poor track	The line is in Category 5 of a system diagram map; the branch line accounts show the line to be marginally profitable.	(i) Increase in branch line profits after rehabilitation. (ii) Any decrease in rates on traffic moving under both alternatives. (iii) Shipper business profits on traffic that wold not move without rehabilitation. (iv) Salvage value of rehabilitation materials at end of planning horizon.	(i) Cost of rehabilitation materials & labor. (ii) As a cost offset the value of any materials released which are sold or used elsewhere.
2. Rehabilitation and Resumption of Service	Non-resumption of Service	Line has been out of service. Changes in local economic conditions indicate a demand for resumed service.	Same as 1A (i,ii,iii,iv, and vii)	Same As 1A

Table 1 (*continued*)

Alternatives for Benefit-Cost Analysis

Project Alternative	Null Alternative	Indications & Comments	Benefits Categories	Cost Categories
3. Acquisition with continued operation	A. Abandonment	This is the expected null alternative, since there is usually no reason to acquire if the railroad will serve the line anyway.	Same as 1A	(I) Cost of acquiring the line. Including the present value of any future rehabilitation required to keep the line operating.
	B. Continued operation	This may occur if the line is currently owned by one party and leased by another.	(I) Present value of stream of lease payments.	(I) Cost of acquiring the line. Including the present value of any future rehabilitation required to keep the line operating.
4. New construction	A. Transportation service continues as is	Transportation services currently provided are profitable.	Same as 1B.	(I) Cost of materials and labor for the capital improvement. (II) Present value of any future rehabilitation required to keep line operating or reopen it.
	B. Transportation service is changed (e.g. line is abandoned)	Some transportation services currently provided are unprofitable	Same as 1A (I), (v)	(I) Cost of materials and labor for the capital improvement. (II) Present value of any future rehabilitation required.

Table 2

Calculation Sheet for Transportation Efficiency Benefits
Null Alternative = Abandonment
Project Alternative = Rehabilitation

Item	Amount Per Year
1. Reduced transportation cost to the shipper on base traffic as a result of the rehabilitation.	_____
2. Shipper's profit on <u>incremental</u> traffic (traffic that would not move without the rehabilitation)	_____
3. Branch line projected operating profit (loss) after the rehabilitation	_____
4. NET TRANSPORTATION EFFICIENCY BENEFITS (add lines 1, 2, and 3)	_____

<u>NOTES:</u>

1. Reduced transportation cost on <u>base</u> traffic = Quantity shipped in null alternative x (rate per unit in null alternative minus rate per unit in project alternative).

2. Shipper's profit on incremental traffic should be determined by cooperative dialogue with the shipper and evaluated for reasonability by the analyst.

3. Branch line projected operating profit (loss) = Branch line projected attributable revenue minus projected off-branch costs minus projected on-branch costs (excluding return on value).

Table 3

Calculation Sheet for Transportation Efficiency Benefits
Null Alternative = Continued Operation
Project Alternative = Rehabilitation
Note: No change in rates between project and null alternatives

Item	Amount Per Year
1. Branch line operating profit after rehabilitation	_____
2. Branch line operating profit before rehabilitation	_____
3. NET TRANSPORTATION EFFICIENCY BENEFITS (subtract line 2 from line 1)	_____

NOTES:

(1) Branch line operating profit = Branch line attributable revenues minus off-branch costs minus on-branch costs (including return on value).

(2) Where the effects of rehabilitation are directly traceable to changes in specific cost elements (e.g. crew costs), it is adequate to simply calculate the value of each of those changed costs and sum them to arrive at the total transportation efficiency benefits, without having to calculate total branch line operating profit before and after rehabilitation.

Table 4

Calculation Sheet for Transportation Efficiency Benefits
Null Alternative = Continued Operation
Project Alternative = Rehabilitation
Note: Rates are Reduced Under Project Alternative
(or are kept from rising)

Item		Amount Per Year
1.	Reduced transportation cost to the shipper on base traffic as a result of the rehabilitation	_____
2.	Shipper's profit on incremental traffic (traffic that would not move without the rehabilitation)	_____
3.	Increase in branch line projected operating profit as a result of the rehabilitation	_____
4.	NET TRANSPORTATION EFFICIENCY BENEFITS (add lines 1, 2, and 3)	_____

Table 5

Calculation of the Present Value of Project Benefits

Benefit Category	Year (a) 1	2	3.....10	
1. Transportation Efficiency Benefits				
2. Lost Labor Output	(b)	(c)	(c)	(c)
3. Business Moving Costs	(b)	(c)	(c)	(c)
4. Increased Highway costs				
5. Salvage Value				
6. Totals				
7. Discount Factor (d)	$(1+i)$	$(1+i)^2$	$(1+i)^3$	$(1+i)^{10}$
8. Present Value of Totals (6 divided by 7)				

(a) Each year from 1 to 10 should have its own column.

(b) If abandonment occurs in a later year, this benefit would be moved to that year.

(c) No entry should be made beyond the temporary period in which people would be employed and/or the business is moved.

(d) The interest rate (discount rate) is represented by the letter i. Calculations to determine the discount factor can be eliminated by using discount Tables available in many economics and finance textbooks or by the use of a pocket calculator which includes a discounting function.

APPENDIX

AN EXAMPLE OF THE METHODOLOGY'S APPLICATION

The following example indicates how the benefit-cost methodology would be applied to a specific project.

Establishing the project alternative. In this particular case, the project contemplated is rehabilitation of a 45-mile rail branch line. The branch line is in poor condition, and an application for abandonment has been filed.

To determine whether the line can reasonably be expected to continue operating after rehabilitation, a forecast of revenues and expenses is generated (shown in Table A-1). Although the line's operating profit will be positive, it is not sufficient to provide an adequate return for the railroad for the $610,000 it could receive by scrapping the line. Nevertheless, the railroad has consented to withdraw its abandonment application if the line is rehabilitated. Therefore, the project alternative is rehabilitation and continued operation.

Determining the project costs. The project will be phased, with the first half of the rehabilitation to occur in year zero (the current year) at a cost of $200,000 and the remaining work to occur in year one at a cost of $250,000. The year one cost has a present value of $235,850, which is $250,000 divided by 1.06 (achieved through application of the discount rate discussed subsequently). This brings the present value of the cost of all rehabilitation work to $435,850. These costs include the cost of ties, ballast, labor, and some rail replacement. Since the line will be abandoned

without the project, the project cost must include the net liquidation value of the line, which in this case, is $610,000 (see Table A-1). The total project costs, then, are $1,045,850.

Determining the null alternative. All indications lead to the conclusion that failure to rehabilitate the line will lead to immediate abandonment, with shippers either finding other modes to ship their goods, reducing output, closing or moving.

Using the standard planning horizon. The FRA-prescribed ten year planning horizon is used.

Using the FRA published discount rate. For the purposes of this example analysis, it is assumed that the real discount rate published by the FRA is six percent. Consistent with the methodology, constant dollars will be used throughout the analysis.

Determining the transportation efficiency benefits. To determine the transportation efficiency benefits, it is necessary to forecast commodity shipments and their prices under both the project and null alternatives. Table A-2 contains such a forecast. As columns 2 and 3 of the table show, the shipments of commodity types 20 and 28 (food and chemicals) will remain the same under either alternative. The shipments of commodity types 24 and 26 (lumber and pulp) will decline substantially if the branch line is abandoned. Columns 4 and 5 of the table show the forecasted unit price per carload for each commodity. Columns 6 and 7 of the table show the total carrier charges that would be paid by the shippers

under each alternative. Note that the total carrier charge for commodity 26 (pulp) declines not because of a lower price but because of the large decrease in the amount shipped. Column 8 shows annual price differences on base traffic. This is found for each commodity by multiplying the number of carloads of base traffic by the difference in transportation price per carload under each alternative. The base traffic is the smaller of the figures in columns 2 and 3. For example, the base traffic price difference for commodity 24 is 2,000 carloads X ($260 per carload-$160 per carload), or $200,000. Column 9 is the shipper's profit on making, shipping and selling incremental traffic. This data would be obtained from conversations with the shippers and independent evaluation of data provided by them. Incremental traffic is the column 2 figure minus the column 3 figure. The sum of column 8, the sum of column 9, and the operating profit on the line (shown on Table A-1) represent the total annual transportation efficiency benefits of rehabilitating and retaining the branch line. These figures are shown and totalled on Table A-3.

Calculating secondary efficiency benefits. Since no businesses would move under the abandonment option, no business relocation costs are involved. However, some temporary unemployment will result. Information provided by the railroad and the shippers, supplemented by field research in the local communities, leads to the estimate that the abandonment and reduction of shipper output will lead to the temporary loss of 30 jobs. State unemployment

data shows that the average unemployed person will find a new job in about six weeks and that the average weekly pay is $200. Thus, the total value of lost labor output is $36,000.

Calculating salvage value for the last year in the planning horizon. In this case the cost of the project included the rehabilitation work and the net liquidation value of the entire line. It is estimated that in ten years the salvage value will be approximately $700,000.

Calculating the benefit-cost ratio. The benefit-cost ratio calculation is shown on Table A-4. Benefits for each year are shown separately and summed, and each year's sum is discounted to a present value. The total present value of the benefits is then divided by the project cost to yield a benefit-cost ratio of 2.8, showing the project to be worthwhile from an economic efficiency viewpoint.

TABLE A-1

Forecasted Annual Branch Line Revenues And Expenses

Revenue	$650,000
Off-Branch Costs	240,000
On-Branch Costs	
Maintenance of Way	140,000
Transportation	130,000
Taxes	15,000
Management and Administration	41,000
Insurance	35,000
Operating Profit	49,000
Return On Value*	(73,200)
Economic Profit	(24,200)

*12% of a net liquidation value of $610,000

Table A-2

Commodity Shipment and Tariff Forecasts
(Annual Data)

STCC Code	Amount Shipped (Carloads) Alt. 1	Alt.2	Transportation Price Per Carload ($ per carload) Alt. 1	Alt.2	Annual Transportation Charges ($ per year) Alt. 1	Alt 2.	Base Traffic Price Difference ($ per year)	Shippers Profit o Incremental Traff ($ per year)
20	125	125	210	270	26,250	33,750	7,500	-0-
24	3000	2000	160	260	480,000	520,000	200,000	50,000
26	200	80	133.75	250	26,750	20,000	9,300	6,975
28	450	450	260	300	117,000	135,000	18,000	-0-
Totals							234,800	56,975

Note: Alt. 1 is rehabilitation
Alt. 2 is abandonment

TABLE A-3

Calculation of Annual Efficiency Benefits from Implementing Rehabilitation Alternative

Type of Benefit	Amount Per Year
1. Reduced transportation cost to the shipper on base traffic	$234,800
2. Shipper profit on incremental traffic	56,975
3. Branch line projected operating profit (loss) after the rehabilitation	49,000
NET ANNUAL TRANSPORTATION EFFICIENCY BENEFITS	**$340,775**

Table A-4

Calculation of the Present Value of Rehabilitation Project Benefits

Benefits Category	YEAR 1	2	3	4	5	6	7	8	9	10
1. Transportation Efficiency Benefits	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$ 340,775	$ 340,775
2. Lost Labor Output	36,000	--	--	--	--	--	--	--	--	--
3. Salvage Value-end of Period	--	--	--	--	--	--	--	--	--	$ 700,000
4. Total Benefits (constant $)	$376,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$340,775	$1,040,775
5. Discount Factor (at 6%)	1.060	1.124	1.191	1.262	1.338	1.418	1.503	1.593	1.689	1.790
6. Present Value (4 divided by 5)	$355,448	$303,181	$286,125	$270,028	$254,690	$240,321	$226,730	$213,920	$201,761	$ 581,438

7. SUM OF PRESENT VALUES OF BENEFITS = $2,933,642

8. PRESENT VALUE OF COSTS = $1,045,850

9. BENEFIT-COST RATIO (7 - 8) = 2.8

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